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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/737,323	12/16/2003	Richard Hollingsworth Cannon	3060P2649	5939

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4204 NORTH BROWN AVENUE
SCOTTSDALE, AZ 85251

EXAMINER	
WILLIAMS, LAWRENCE B	
ART UNIT	PAPER NUMBER
2611	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
2 MONTHS	02/07/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/737,323	CANNON ET AL.	
	Examiner	Art Unit	
	Lawrence B. Williams	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 2 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 December 2003*.

2a)☐ This action is **FINAL**. 2b)☐ This action is non-final.

3)☒ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *1-25* is/are allowed.

6)☐ Claim(s) _____ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 April 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a) because Fig. 3 fails to show designated I and Q signal components as described in the specification on page 13, lines 5-6. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

2. The drawings are objected to because the examiner suggests, E_{bl} / N_o as the horizontal axis legend. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply

to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The disclosure is objected to because of the following informalities:

a.) In line 9 of page 4, the examiner suggests, (BER).

b.) In line 23 of page 9, the examiner suggests, E_{bl} / N_o.

c.) In lines 20, 22 of page 10, the examiner suggests, E_{bl} / N_o.

d.) In line 5 of page 13, applicant makes reference to "complex multiplier 32". The examiner assumes applicant means "complex multiplier 31".

e.) In line 16 of page 14, the examiner suggests, E_{bl} / N_o.

f.) In line 17 of page 17, the examiner suggests, E_{bt} / N_o, and in line 18, the examiner suggests applicant use either "using" or "with", but not both.

g.) In line 9 of page 20, the examiner suggests, "There are 8!".

h.) In lines 8, 16 of page 24, the examiner suggests, E_{bt} / N_o.

i.) In lines 6, 15 of page 24, the examiner suggests, E_{bt} / N_o.

Appropriate correction is required.

4. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Allowable Subject Matter

5. Claims 1-25 are allowed.

6. The following is a statement of reasons for the indication of allowable subject matter: The instant application discloses a method and system for modulating and detecting high data rate symbol communications. A search of prior art records has failed to teach or suggest alone or in combination:

"a receiver comprising: a demodulator for receiving symbol signal frames and producing quadrature demodulated output signals; a mapping look-up unit coupled to said demodulator for receiving said quadrature demodulated output signals and determining a three-bit symbol decode associated with points on a predetermined constellation, wherein said

constellation has the property of having a first and second point of differing amplitude and zero reference phase, a third point having an amplitude equal to an amplitude of said first point and a 180 degree reference phase, a fourth point having an amplitude equal to an amplitude of said second point and a 180 degree reference phase, fifth and sixth points having real magnitudes substantially equal to said amplitude of said first point and equal imaginary magnitudes of opposite sign, and seventh and eighth points having real magnitudes substantially equal to a negation of said amplitude of said first point and equal imaginary magnitudes of opposite sign, wherein said mapping look- up unit produces probability values for each bit in said three-bit symbol decode from log-likelihood grouping maps for determining membership within a grouping associating said points with values of each bit of said three-bit symbol decode, whereby magnitudes of said quadrature demodulated output signals determine whether or not each symbol signal frame has membership in a first subgroup corresponding to a logical zero or membership in a second subgroup corresponding to a logical one for each grouping; and a codec coupled to an output of said mapping lookup unit for receiving said probability values for each bit and determining values of each bit" as disclosed in claim 1.

"a method for receiving a communications signal bearing three- bit symbol encodes associated with points on a predetermined constellation, wherein said constellation has the property of having a first and second point of differing amplitude and zero reference phase, a third point having an amplitude equal to an amplitude of said first point and a 180 degree reference phase, a fourth point having an amplitude equal to an amplitude of said second point and a 180 degree reference phase, fifth and sixth points having real magnitudes substantially equal to said amplitude of said first point and equal imaginary magnitudes of opposite sign, and

seventh and eighth points having real magnitudes substantially equal to a negation of said amplitude of said first point and equal imaginary magnitudes of opposite sign, said method comprising: demodulating a stream of symbol signal frames and producing quadrature demodulated output signals; retrieving log-likelihood probability values estimating a likelihood of each symbol signal frame being transmitted as each point of said constellation, each of said probability values retrieved in conformity with values of said quadrature demodulated output signals and for an associated one of said points; and determining symbols associated with said signal frames in conformity with said probability values" as disclosed in claim 14.

"a receiver comprising: a demodulator for receiving symbol signal frames and producing quadrature demodulated output signals; a mapping look-up unit coupled to said demodulator for receiving said quadrature demodulated output signals and determining a three-bit symbol decode associated with points on a predetermined constellation, wherein said constellation has eight points having complex magnitudes of (K/2,0), (3K/2,0), (K/2, K), (-K/2, K), (-K/2,0), (-3K/2,0), (-K/2, K) and (K/2, K), respectively for a particular rotation of said constellation, where K is an arbitrary coefficient for determining an overall amplitude of said constellation, wherein said mapping look-up unit produces probability values for each bit in said three-bit symbol decode from log-likelihood grouping maps for determining membership within a grouping associating said points with values of each bit of said three-bit symbol decode, whereby magnitudes of said quadrature demodulated output signals determine whether or not each symbol signal frame has membership in a first subgroup corresponding to a logical zero or membership in a second subgroup corresponding to a logical one for each grouping, wherein a grouping associated with a first bit of said three-bit symbol decode divides said constellation

between a first subgroup including said first, second, fifth and seventh points and a second subgroup comprising all points that are not members of said first subgroup, wherein a grouping associated with a second bit of said three-bit symbol decode divides said constellation between a third subgroup including said first, third, seventh and eighth points and a fourth subgroup comprising all points that are not members of said third subgroup , and wherein a grouping associated with a third bit of said three-bit symbol decode divides said constellation between a fifth subgroup including said first, third, fifth and sixth points and a sixth subgroup comprising all points that are not members of said fifth subgroup; and a forward error correction block coupled to an output of said mapping look-up unit for receiving said three-bit symbol decode from said mapping look-up unit and providing a corrected data stream in response to a sequence of three-bit symbol decodes" as disclosed in claim 20.

"a carrier generation circuit for providing a reference signal for demodulating a received sequence of symbol frames decoded as quadrature demodulated signals, said circuit comprising: an oscillator having an output for providing said reference signal and an control input for receiving a phase error signal; a switching circuit having an output coupled to said control input of said oscillator for selectively applying an input phase error signal in response to a switch control input signal; a phase error magnitude circuit having inputs coupled to said quadrature demodulated signals for generating said input phase error signal and an output coupled to said switching circuit; and an amplitude detector having inputs coupled to said quadrature demodulated signals and an output coupled to said switch control input signal, whereby a phase of said oscillator is controlled in conformity with a subset of said symbol signal frames in

conformity with a detected amplitude of said quadrature demodulated signals" as disclosed in claim 22.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a.) Strolle et al. discloses in US Patent 5,872,815 Apparatus For Generating Timing Signals For A Digital Television Signal Receiver.

b.) Touzni et al. discloses in US Patent 7,031,405 B1 Carrier Phase Estimation Based On A Single-Axis Constant Modulus Cost Criterion And BussGang Criteria.

c.) MacDonald et al. discloses in US Patent 5,504,453 Method And Device For Estimating Phase Error.

8. This application is in condition for allowance except for the following formal matters:

a.) Drawing objections as noted above.

b.) Specification objections as noted above.

Prosecution on the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

A shortened statutory period for reply to this action is set to expire **TWO MONTHS** from the mailing date of this letter.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lawrence B Williams whose telephone number is 571-272-3037. The examiner can normally be reached on Monday-Friday (8:00-6:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ghayour Mohammad can be reached on 571-272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Lawrence B. Williams
lbw
January 29, 2007

EMMANUEL BAYARD
PRIMARY EXAMINER